AN INQUIRY
INTO FINFISH AQUACULTURE
IN BRITISH COLUMBIA

REPORT AND RECOMMENDATIONS

Presented to the Government of British Columbia

by

David Gillespie, Chairman
B. C. Finfish Aquaculture Inquiry

December 12, 1986

Canadian Cataloguing in Publication Data

B.C. Finfish Aquaculture Inquiry

An inquiry into finfish aquaculture in British Columbia

Recommendations also published separately.
ISBN 0-7726-0593-9

1. Salmon. 2. Fish-culture - British Columbia. 3. Aquaculture - Environmental aspects - British Columbia. I. Gillespie, David. II. British Columbia. Ministry of Forests and Lands. III. Title.

SH167.S17B 1986 333.956 C87-092022-7

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LETTER OF TRANSMITTAL

December 12, 1986

Honourable Jack J. Kempf
Minister
Ministry of Forests and Lands
Legislative Buildings
Victoria, B.C.

Honourable John Savage
Minister
Ministry of Agriculture and Fisheries
Legislative Buildings
Victoria, B.C.

Dear Sir:

It is my pleasure to transmit my Report and Recommendations on Finfish Aquaculture in British Columbia, as commissioned by the Government of British Columbia on November 6, 1986.

Respectfully yours,

David W. Gillespie
Chairman

ACKNOWLEDGEMENTS

The Inquiry wishes to express its appreciation to the private citizens, interest groups, and government agencies who provided the information and support necessary to complete this report on finfish aquaculture. A special note of gratitude is due to those who responded to the challenge to prepare written submissions at short notice, and to those who made time available to attend and participate in the four public meetings held along the coast. The ability of the Inquiry to achieve its 30 day mandate is directly attributable to their efforts and is testament to the impact and interest that finfish aquaculture is generating in British Columbia.

"Commercial fisherman are, I think, by and large philosophically unprepared for this kind of a change. I am a high seas hunter".

1.0 PURPOSE AND SCOPE OF THE INQUIRY

1.1 TERMS OF REFERENCE

The Inquiry was officially established on November 6, 1986 with the appointment of David Gillespie as its chairman. The appointment was made by the Honourable Jack J. Kempf, Minister of Forests and Lands under authority of the provincial Land Act and in response to a moratorium on the issuance of finfish aquaculture tenures imposed by the Minister on October 31, 1986.

The terms of reference established by the Ministry of Forests and Lands provided for appointment of a single commissioner of inquiry, with secretarial services and support provided by the Ministry. The commissioner was to consult with appropriate government agencies and submit a report with recommendations to the Minister of Forests and Lands within 30 days of commencing the inquiry.

The report and recommendations were to be made on the following aspects of marine finfish aquaculture operations:

(a) Impact on commercial fishery operations, markets, and localized production-related facilities.
(b) Potential environmental impacts and effect on wild fish stocks.
(c) Impact and involvement of local government and interest groups.
(d) Government approval and monitoring procedures.

The terms of reference also identified specific tasks to be performed. These were to establish a process and schedule for review of concerns of key interest groups, hold meetings with interest groups in coastal communities, review background material provided by government agencies, summarize issues, and formulate recommendations to resolve these issues.

1.2 MORATORIUM ON CROWN LAND TENURES

The Inquiry was precipitated by a moratorium on the issuance of Crown land leases and licences of occupation for finfish aquaculture operations. This moratorium was imposed on October 31, 1986 for an indefinite period by the agency responsible for issuing Crown land tenures, the Ministry of Forests and Lands.

The moratorium is a result of concerns raised by the B.C. Fishery and Allied Workers Union (UFAWU). The UFAWU called for a moratorium to allow a full review of the impacts of the salmon farming industry, given the rapid increase in Crown land applications for finfish aquaculture during the past year.

The moratorium imposed by the Ministry of Forests and Lands applies to the issuance of leases and licenses of occupation for finfish aquaculture. The Ministry continues to accept applications for all tenure, including "Section 10" licences,[1] but does not adjudicate and issue leases or licences of occupation for the production of finfish until the lifting of the moratorium. Any verbal or written commitments to issue a tenure which were made prior to the moratorium may be honoured as legal contracts. Where the moratorium has severely jeopardized financial, legal, or production commitments of an applicant, the possibility exists for an exemption of the application from the moratorium by the Ministry.

From the initiation of the moratorium to December 5, 1986 the Ministry has accepted a further 31 applications for finfish aquaculture sites, 26 of which are Section 10 applications.

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1 A licence issued under Section 10 of the Land Act, which permits an applicant to enter and occupy a site to conduct research and investigative studies for up to one year. The licence is not renewable or assignable, and does not authorize fish production.

2.0 THE INFORMATION GATHERING PROCESS

2.1 METHODS OF INQUIRY

The general approach to the Inquiry was established in the terms of reference (Section 1.1). Major decisions were required, however, on what process would be used to contact and consult the greatest possible number of interest groups along the coast, as well as to collect as much background information as possible in the short time available.

The Inquiry decided the best approach to be one of conducting a series of open public meetings in strategic coastal communities where both acquaculture and the commercial fishery are in evidence. These meetings would be supplemented by meetings with all government agencies involved in finfish aquaculture and commercial fisheries. Where time and scheduling would permit, the Chairman would also be available for meetings with individual citizens and interest groups. In addition, the opportunity to send a written submission to the Inquiry would also be made available for the information gathering period, ending November 30, 1986.

2.1.1 Stage One (Nov. 12 - Nov. 20)

The first few days of the Inquiry were spent in making logistical arrangements for the public meetings, advertising, and inviting all known interest groups to make presentations. Public hearings were scheduled for Parksville on November 21 (south and central Vancouver Island), Campbell River on November 24 (north Vancouver Island), Sechelt on November 26 (south coast) and Prince Rupert on November 26, 1986 (north and central coast). A public notice, outlining the Inquiry Terms of Reference and requesting submissions, was prepared and placed in all appropriate coastal community newspapers. In addition, 32 local government agencies and 45 private interest groups and associations representing all known areas and types of concern with finfish aquaculture were contacted and invited to make presentations. Provincial and federal agencies were also contacted formally with a request to arrange meetings and prepare position statements.

Meetings were held with private interest groups at their request, and with the provincial ministries of Environment and Parks, Forests and Lands, Agriculture and Fisheries, and Municipal Affairs.

On November 17, a news release announcing the dates and locations of the public meetings was distributed to the electronic media and to all newspapers along the coast. Staff began to prepare agendas for each public meeting in response to the many interest groups who began to declare their intent to present briefs at specific locations.

2.1.2 Stage Two (Nov. 21 - Nov. 28)

The second stage of the Inquiry was devoted to the four public meetings. An "information-style" meeting structure was used, in which all verbal presentations, questions to speakers and general comments were directed to the Chairman at specific allocated times during each session. Morning, afternoon, and evening sessions were scheduled for each meeting to allow full opportunity for the public to contribute to the information base.

A preliminary schedule of speakers was posted at the beginning of each meeting. Those who decided at the meeting to make a formal submission were added to the schedule as the day progressed. When gaps appeared in the schedule, they were used by the Chairman to entertain comments and discussion from the general audience, and to call for additional submissions. When time permitted, the public was given opportunity to ask questions about a presentation immediately following its delivery. All speakers were required to identify themselves and all of the proceedings were recorded.

This meeting structure proved to be highly educational and informative for both the Inquiry and the general public. It provided the necessary control to complete each session on time and with ample public participation. Most importantly, it prevented the development of "cross-floor" adversarial relationships among interest groups, often a characteristic of less-structured public meetings.

Meetings were also held during this period with the Canadian Coast Guard and the B.C. Salmon Farmers Association.

2.1.3 Stage Three (Nov. 29 - Dec. 2)

During Stage Three of the Inquiry, final meetings were held with key government agencies. The Chairman met with the Federal Department of Fisheries and Oceans and the Provincial Ministry of Economic Development. Two short meetings were also held to receive written submissions from interest groups unable to attend the previously scheduled public meetings. Finally, the Inquiry reviewed and collated the many written briefs and letters which had been mailed to the Vancouver Office in response to the call for written submissions.

2.1.4 Stage Four (Dec. 3 - Dec. 12)

Stage Four consisted of analyzing all the information obtained during the first three stages of the Inquiry, and formulating the final report and recommendations.

2.2 THE RESPONSE

2.2.1 General Response

The general response to the call for information was overwhelming, given the short time period available for preparation and delivery. A total of 258 submissions were received in the form of letters, formal briefs, and oral presentations at the public meetings. Many of the submissions were supplemented with background material, such as newspaper clippings, thesis dissertations, scientific journal articles, environmental studies, and plans, policies and procedures of various government agencies. These submissions came from local government, provincial government, consulting companies, commercial fishermen, salmon farmers, oyster growers, seaweed farmers, aviation companies, fish processing companies, construction companies, native groups, fish

and wildlife groups, marine recreationists, tow boat operators, environmental groups, upland owners, divers, and college students. Several citizens with no specific affiliation also made presentations at the public meetings.

Attendance at the public meetings was also high given the short notice provided. A total attendance of 387 was recorded from the registration book placed at the entrance to each meeting. Attendance was greatest at Sechelt, where 146 people sat through some part or all of the sessions. Campbell River attracted 110 people, while the Parksville and Prince Rupert meetings recorded 72 and 59 participants, respectively. (See Table 1)

2.2.2 Range of Interest

An indication of the range of interests affected by finfish aquaculture is evident in a review of the affiliation of participants at the public meetings. In total 18 percent of those attending the meetings were engaged in aquaculture, 11 percent in the commercial fishery, and 5 percent in related fishing activities. Seven percent of total attendance represented local government and 6 percent native groups. Private citizens represented 34 percent of the turnout.

With respect to specific interest areas, it is worth noting that local citizens interest was highest at Sechelt (46% of attendees) and Campbell River (32% of attendees). Native peoples representation was very high in Prince Rupert (27% of audience). The Sechelt meeting contained the highest proportion of commercial fisherman compared to other meetings; while at Campbell River the aquaculture industry had its greatest representation.

2.2.3 Government Response

The local, provincial, and federal agencies contacted were quick to respond to the opportunity to provide background information. In general, local government was much more willing to present a formal

position on finfish aquaculture than were provincial and federal agencies. The latter were prepared to provide background information and staff recommendations. Overall, 29 formal position statements were received from various levels of government.

2.3 EXPECTATIONS

A wide range of issues became evident during the Inquiry. Some are beyond the terms of reference and cannot be dealt with in this report. Expectations for their resolution have no doubt been raised, and consequently they form part of the information record in the event that a supplementary evaluation of the issues is undertaken by the various agencies involved in finfish aquaculture.

One of the most important expectations raised by the Inquiry is that the final report will be used to provide better public information about finfish aquaculture and establish better communication among the participating interests. To satisfy this expectation, a comprehensive review of issues has been made an integral part of the report.

2.4 INFORMATION RECORD

The Inquiry places great importance on the need to make available to the public its record of information. This approach is necessary not only to allow more detailed assessment of issues and recommendations by government, but also to alleviate concerns expressed by some members of the public that the "real" facts about finfish aquaculture are being hidden from public view. It is also considered an important way to meet the expectations for better public information and communication as mentioned in Section 2.3. This report therefore includes, as three appendices, the transcripts of public meetings, and all written submissions.

For matters of personal confidentiality, not all position statements from provincial government agencies are included. Background material relevant to those statements is provided, however.

TABLE 1

B.C. FINFISH AQUACULTURE INQUIRY
AFFILIATION AND ATTENDANCE AT PUBLIC MEETINGS

Interest Affiliation \ Location Meeting	PARKSVILLE (%)	CAMPBELL RIVER (%)	SECHELT (%)	PRINCE RUPERT (%)	TOTAL (%)
Government					
° Provincial	3 (4.2)	0	0	2 (3.4)	5 (1.3)
° Local	10 (13.8)	7 (6.4)	8 (5.5)	3 (5.1)	28 (7.2)
° Federal	2 (2.8)	3 (2.7)	0	3 (5.1)	8 (2.1)
Fishing Industry					
° Wild Fishery	7 (9.7)	8 (7.3)	22 (15.1)	5 (8.5)	42 (10.8)
° Aquaculture	15 (20.8)	29 (26.4)	17 (11.6)	7 (11.9)	68 (17.6)
° Other Related	4 (5.6)	6 (5.5)	8 (5.5)	1 (1.7)	19 (4.9)
Forest Industry	1 (1.4)	1 (0.9)	1 (0.7)	0	3 (0.8)
Other Bus./Industry[1]	4 (5.6)	5 (4.5)	9 (6.2)	2 (3.4)	20 (5.2)
Environmental GPS	2 (2.8)	3 (2.7)	3 (2.1)	0	8 (2.1)
Recreation	6 (8.3)	6 (5.5)	0	0	12 (3.1)
Native Groups	1 (1.4)	5 (4.5)	1 (0.7)	16 (27.1)	23 (5.9)
Private Citizens	14 (19.4)	35 (31.8)	67 (45.9)	15 (25.4)	131 (33.9)
Press/Media	3 (4.2)	2 (1.8)	10 (6.8)	5 (8.5)	20 (5.2)
MEETING TOTAL	72	110	146	59	387

1 Includes construction, building supply, diving, consultants etc. and unidentified companies.

NOTE: These figures represent registered attendance. Some participants did not register.

3.0 THE MAJOR ISSUES

3.1 CENTRAL ISSUES

3.1.1 Extent of Government Support and Control

The extent of support and control of finfish aquaculture by all levels of government pervaded much of the Inquiry's review of major issues. The lack of a clear, comprehensive and integrated policy on aquaculture was identified by fish farming groups as a hindrance to the development of the industry. Some industry spokesmen believe that federal agencies are reluctant supporters of aquaculture because of traditional working relationships with the commercial fishery. In contrast, many of the commercial and sport fishery groups believe that the federal agencies are becoming too supportive of finfish aquaculture, and to the detriment of the Salmonid Enhancement Program. In particular, the diversion of SEP hatchery eggs to supply the aquaculture industry is seen as a direct indication of the withdrawal of federal support for the commercial fishery.

The "gold rush" image which now pervades the finfish aquaculture industry is viewed as another issue involving government support and control. Established farm interests are generally concerned that unbridled government enthusiasm and simple rules have led to speculative activities which jeopardize their own future expansions. In addition, the large number of applications has become a detriment to the whole industry due to adverse reactions among the commercial fishing industry and other interests. The fact that many of the sites are considered unlikely to be approved for farm use is not generally understood.

Several local government agencies who have successfully attracted aquaculture into their areas now identify the need for a more cautious level of support.

The extent of government control is also of concern. Most farm industry groups have called for a reduction in controls over business management, claiming the government's involvement should be limited to

land and environmental concerns. Government agencies have pointed out that government support to date has been limited and directed towards technology transfer, minor tax exemptions, business planning assistance and a small scale loan program. Other groups have called for increasing controls on foreign investment, marketing, and environmental alteration.

3.1.2 The Moratorium

The necessity and duration of the moratorium was frequently mentioned. The majority of interest groups, including most salmon farmers, welcomed the moratorium (and the resultant Inquiry) as a means of reviewing the industry's progress and problems and re-establishing its priorities. Several local governments questioned the apparent "about-face" of the provincial government after having spent consi'erable effort and funds to promote the industry in their respective regions.

Salmon farmers urged the moratorium be lifted immediately upon conclusion of the Inquiry to permit resumption of business planning and to avoid financial losses. Most native groups wanted the moratorium lifted to allow their own aquaculture activities to proceed; although a minority wanted it contingent on settlement of aboriginal land claims. The U.F.A.W.U. and other commercial fishery groups supported the settlement of land claims, along with completion of environmental impact studies and a more elaborate commission of inquiry, prior to lifting of the moratorium. The Islands Trust requested the moratorium be removed on a regional basis, contingent on completion of local government zoning for aquaculture.

3.1.3 Public Knowledge

Evident in discussions on all major issues was lack of public knowledge of the aquaculture industry and of existing government policies and programs.

Several farming interests identified the main benefit of the Inquiry as providing better understanding of fish farming. The placing of a mora-

torium on tenure approvals was itself the result of a lack of information on industry impacts. One local government submission termed salmon farming a "public relations disaster". Studies that would provide many answers to the concerns raised by commercial fishermen and other groups about marketing and environmental impacts are not all in general distribution and some submissions charged government with intentionally withholding their findings. On the other hand, the finfish farm industry was concerned that its economic benefits and potential were generally unknown, citing the estimated $150 million in annual revenue projected by 1995, and employment of nearly 3,500. The general public were unaware of existing approval procedures, the agencies involved, siting and diligent use requirements, bonding and other matters. Without such information, the image of rampant and uncontrollable development of fish farming has been easily spread.

Despite differences of opinion, every major interest group expressed a desire to cooperate and co-exist. The issue is to identify the circumstances under which these groups will be willing to do so.

3.1.4 Native Involvement

The question of native peoples involvement in aquaculture arose in discussion of all the basic issues being addressed by the Inquiry.

Most bands voiced support and enthusiasm for finfish aquaculture, and its potential for generating direct and indirect employment for their people in the small coastal communities of B.C. There is, however, a concern that native venture opportunities will be quickly lost as a result of a speculative rush of licence applications, overcapitalization, and high subsequent failure rates which will deter future financial support for native enterprise. Many bands are about to enter the industry at the encouragement of various federal reports which recognize the compatibility of fish farm operations with native skills and tradition. There is also concern about loss of native employment in the commercial fishery, and on the environmental effects of fish farming in their traditional harvest areas.

All bands derided the lack of consultation by the provincial Lands agency concerning tenure applications fronting and adjacent to indian reserves. Those bands which have recently made applications for provincial land tenure were also concerned that the aboriginal land claims dispute would prejudice the processing and approval of their applications, as well as prejudice the outcome of their claim to such lands.

3.2 MARKETING ISSUES

3.2.1 **Pricing Impact of Farm Salmon**

The commercial fishing industry has expressed major concern over the impact of farm salmon on the market price of wild salmon. Several briefs provided information on recent price declines due to competition from farmed salmon produced in Norway. The UFAWU expressed the concern that there would be an eventual head-on collision between B.C. farm salmon and the wild catch, with both industries suffering through drastic price declines. In contrast, the salmon farming groups believed that B.C. farm salmon will compete only minimally with B.C. wild salmon. Recent reports and studies presented by both federal and provincial agencies were cited as evidence that the recent price declines of wild catch are well within the range of price fluctuations experienced over the past two decades. It was further pointed out that only chinook and coho salmon prices were at issue, and these account for only 15-30% of the wild fish caught by B.C. fishermen. Several participants admitted that even with year-round competition, the worst that could happen would be a natural elimination of inefficient producers in both industries and lower consumer prices, neither of which would be undesirable.

3.2.2 **Impact on Market Demand and Supply**

The commercial fishery groups contended that the anticipated growth in B.C. farm salmon production will lead to market saturation and called for regulations to restrict such production, either through a ban on issuing of tenures or through production controls. It was pointed out

that in Norway, the government has instituted limits on the output of individual farms. The farm industry pointed to recent studies in world market trends which suggested that the increased availability of salmon due to fish farms is actually leading to increased consumption. It was also stated that B.C. farm salmon is being targeted on U.S. specialty markets for fresh fish, and not the canned or frozen fish markets where most of the wild catch competes. B.C. farm salmon is apparently being marketed in the winter months when frozen and fresh chinook and coho is generally unavailable. B.C. farm salmon producers would be foolish, according to one industry submission, to bother trying to compete head on with the fresh wild catch market when it can pursue a separate and more lucrative, expanding market elsewhere. The real marketing battle, it was suggested, will be between the various world suppliers of farm salmon.

3.2.3 Effect on Processing Facilities

A primary concern of commercial fishing industry spokesmen was the future effect of increased salmon farm production on existing processing facilities. The UFAWU expressed concerns that new plants would be built to process farm salmon, thereby aggravating the current overcapitalization and undermining employment at existing, underutilized facilities. It demanded a freeze on the issuance of new plants. The B.C. Fisheries Council, comprised of major fish processing companies in the province, indicated that current plants have sufficient physical capacity to accommodate the potential increase in farm salmon product for at least 5 years. However, the Council reported that a trend was beginning whereby many processing companies were joint venturing with fish farms to market their product, thereby using the excess capacity of existing plants. Government sources indicated that over 50% of farm salmon had recently been contracted for processing by the major unionized companies. Some companies were offering low interest loans to fish farms as an incentive for such contracts. The Prince Rupert Fisherman's Co-op was mentioned as being particularly progressive in its outlook, as it had begun its own salmon and trout farms to supply

its plants and offered various incentives to its members to become involved in fish farming.

3.2.4 Impact on Employment

Various commercial fishing interests also raised employment as a major issue, citing the large base of full time and part time jobs generated by the B.C. salmon fishery and its high wage levels. It expressed the view that the salmon farming industry would never generate this level of employment, and consequently should not be permitted to put the employment health of the salmon fishery in jeopardy. Comments were also made about the low wages paid to salmon farm workers. The salmon farming industry submissions also identified employment as an issue. A very large growth was projected in associated feed plants, plastics and equipment manufacturing, construction and other s rvice industries. Many submissions were received in the Sechelt area confirming extensive increases in business due to finfish aquaculture activity. Several identified the prospects for increasing fishery jobs through fishing for non-commercial or underutilized wild fish to supply new feed plants.

3.2.5 Need for Marketing Strategy and Research

Need for a comprehensive market strategy for B.C. salmon products was identified as an issue to be dealt with by several government agencies, due to the increasing erosion of the commercial fishery share of the world salmon market. Trends in the B.C. fishery towards high labour rates, and increasing protectionism in the U.S.A. and other markets were also mentioned as reasons for initiating a strategy to identify new markets, new product lines, and higher quality and appearance of product from both industries. The Salmon Farmers Association pointed out that it had already commissioned studies on marketing strategies for its products, with financial support from government. Similarly the B.C. Fisheries Council was given a large 3 year grant by government to assist member companies in their export marketing activities. The

UFAWU however, identified its marketing strategies as ensuring a reduction in B.C. farm salmon and ensuring its proper labelling because of its reported inferior quality and presence of foreign substances. Submissions pointed to the fact that B.C. was one of the few areas in the world capable of sustaining viable commercial wild fishery and farm salmon industries, and it should endeavour to market both products to provide a year round supply of fish to a wide range of consumer markets.

3.3 ENVIRONMENTAL ISSUES

3.3.1 **Disease Transference**

Transfer of fish diseases represented a major issue in the Inquiry. It concerned transmittal of disease between farms, and transmittal between farm fish and wild stock. The most critical issue was the importation of Atlantic salmon eggs, and with them the risk of outbreak of exotic diseases for which Pacific salmon have no natural immunity. The majority of commercial fishery, recreational sport fishery, wildlife, and environmental groups called for an immediate ban on egg importation, citing concerns of federal and provincial specialists, research studies, and reports of outbreaks introduced through similar methods in other countries. Salmon farmers currently involved with Atlantic salmon described the very elaborate egg screening, quarantine and effluent treatment conditions imposed by government as evidence of low risk. The federal and provincial agencies provided a draft agreement which proposes to end Atlantic egg importation by March of 1989, as evidence of their concerns about this disease risk. The Salmon Farmers Association indicated that it shared some of the concerns expressed about egg importation.

The other disease issue involved concerns by commercial fishery interests that farm fish are more susceptible to disease and will transmit such diseases to wild fish stock. The Salmon Farmers Association and government agencies, however provided recent studies to indicate that the risk of transmission of disease from farm to wild stock is minimal, and has never actually been reported. They argued that it was much

more likely that wild stocks would spread disease to farm stock since the farm eggs and smolts are treated and monitored for diseases while natural stock is not. An offshoot of this concern was the separation distance between farm sites, which has been set by the province as 0.8 kilometres to minimize the risk of disease transfer between farm operations. Many interest groups called for an increase in this distance, including the Salmon Farmers Association. There were also concerns raised about the disposal of dead fish and the effluent discharge from fish farms as potential sources of disease transference. Finally, the disease issue also raised concerns over the adequacy of disease diagnostic and veterinary services. Government has to date provided advice and assistance but has insufficient manpower to increase its commitment. It has been assumed the private sector would soon meet this challenge for more services. However, several briefs indicated a basic deficiency in training programs and laboratory services.

3.3.2 Genetic Alterations

The UFAWU and several other fisheries interest groups were concerned about possible escapement of farm stock. It was speculated that they might interbreed with wild salmon and produce undesirable genetic alterations affecting growth, size, quality and other factors. Also of concern was the possibility of escaped Atlantic salmon becoming established in the wild and out-competing native stock. However, government agencies pointed out that these situations were not likely to occur, and referenced the unsuccessful attempts by government during a 30 year period to deliberately establish Atlantic salmon to the B.C. coast. Salmon farmers reported that most "escapements" tend to congregate around the nets in any case, or get eaten by predators.

3.3.3 Predator Control

Control of predators was raised as an issue by a number of environmental organizations and individuals from recreational and fishery interests. The basic concern was that fish farmers were destroying river otters, eagles, herons, seals and various other wild creatures

attempting to obtain a free meal. Despite provincial regulations prohibiting the shooting or entrapment of some of these animals, there was insufficient enforcement capability by fish and wildlife officials. Many farm operators, however, spoke of different approaches they were using to discourage predators, such as false bottom nets, screens, and electric shock. A number of submissions, however, called for a review and identification of appropriate predator control methods.

3.3.4 Impact on Water Quality and Marine Environment

A large number of interest groups expressed concern about potential damage to water quality and the marine environment created by finfish aquaculture. Many cited such effects as buildup of sediments on the sea bed, increased water cloudiness, increased algae growth, mortality of bottom creatures and plants, and destruction or reduced growth of nearby shellfish beds. The sources of these pollution factors were identified as excess fish feed falling through net pens, human waste disposal from living quarters, water current reductions by net pens, and blood and offal from cleaning and preparation of fish for market. These problems were to be encountered where the chosen farm sites have poor tidal flushing, shallow depth, and relatively high nutrient and sediment loads. Several studies performed in Europe and in Puget Sound, Washington were used to reference these problems as expected outcomes of combining improper farm practices with inadequate sites. Several examples were given of locations where site approvals had been made by the provincial Lands agency despite warnings by the DFO of inadequate natural conditions. Many groups called for monitoring of sites and long term studies to properly assess impact. The Oyster Growers Association called for a wide separation between fish farms and oyster farms until more could be found out about the effects on oyster growth. The farm industry acknowledged these potential problems but emphasized that it is in the farmer's own self-interest to minimize such impacts to maintain a healthy growing environment for his fish. It similarly recognized the need for proper site selection and testing. Most farmers already provided extensive monitoring of water quality for culture conditions, while some reported being involved in

specific studies with federal agencies to gauge impact around their sites. The industry also pointed to technological solutions to these potential risks, including bottom sediment vacuums or dispersal fans, and the planting of certain seaweeds to use excess nutrients in the water. Fish farmers also submitted that aquatic life beneath their pens was actually increasing, and that oyster growth was enhanced by nutrients from fish farms. Government agencies also referenced the Puget Sound study and others to indicate that the major environmental impact appears to be on the seabed beneath the farm site and dependent on site specific characteristics. They also reported a recent study in the Sechelt Inlet, which concluded that at present production levels, salmon farms have little effect on surrounding water quality.

3.3.5 **Use of Toxicants and Pharmaceuticals**

Major concerns were raised about the effects of toxicants, antibiotics and hormones on human health and the food chain. The UFAWU identified a number of studies implicating the toxicant tributyltin (TBT) as a human health risk, through its concentration in the flesh of farm salmon and shellfish. The Oyster Growers Association and the UFAWU called for a ban on this toxicant, used as a net pen antifoulant dip. Other submissions merely called for greater awareness of its hazards by fish farmers and the use of alternative antifoulants. Some farms indicated they had stopped using TBT antifoulant for this reason. Government agencies indicated that the main source of antifoulants is from pen construction materials, and that construction standards were being considered for net pens to eliminate use of potentially harmful substances. They also reported recent studies which suggest TBT accumulations can be effectively dealt with. Federal agencies lamented the fact that despite stringent fish inspection standards, the lack of manpower and a close testing laboratory reduced the frequency of periodic checks on toxicant levels in farm fish.

The use of antibiotics was also identified as a problem by several groups, with concerns expressed that excessive quantities were being used to combat pathogens in farm fish, and which might lead to development of antibiotic resistant bacteria that could find their way into

the food chain. Government provided comments from a major study indicating that there is little likelihood of these problems occurring since the substances are water soluble and quickly diluted. Other submissions from a professional pharmacologist indicated that antibiotics are metabolized by the fish. Work was also cited which showed a low chance that antibiotic-treated fish food would contaminate nearby shellfish.

Discussion also took place on hormones used to manipulate the sex of fish for brood stock. While several interest groups were concerned about hormonal concentrations in fish and effects on humans, the farming industry indicated that there was no scientific evidence to show any harmful effect. It was also pointed out that farm fish have fewer hormones in their system when marketed than do wild fish.

3.3.6 **Health and Safety of Farm Workers**

Several people identified occupational concerns related to the working environment. A professional diver provided a lengthy discussion of inadequacies of fish farms in providing safe diving conditions and dealing with diving accidents. The lack of coverage by regulations, and the lack of proper net pen diver training were also considered problems. The UFAWU pointed to a number of recent diving accidents on farms, and was concerned that the risks would increase with the growth of the industry. The major aquaculture associations indicated their concerns about such deficiencies, and stated they have been working on standards. Some companies reported having their own safety committees for employees. A submission from a major finfish company also discussed the lack of safety standards on fish farms, including guard rails, personal flotation devices, emergency medical aid, and requirements for handling of chemicals and pharmaceuticals.

3.4 AGENCY APPROVAL ISSUES

3.4.1 **Proliferation and Abuse of Section 10 Licenses**

The Inquiry found Section 10 licences to be very contentious. The very large number of these licences issued in the past year was of major concern to all parties involved in the Inquiry, including the established aquaculture industry. A general misunderstanding of their intent and limitations was identified by provincial agencies as a reason for their unpopularity. Some instances of abuse were also identified in which licence holders began illegal farming operations on these sites with no subsequent remedial measures taken by government. Established operators were concerned that licences were being used for financial gain through speculation, and as means of tying up sites to prevent competition. Submissions dealing with Section 10 applications either recommended a halt to their use or a means of reducing their attractiveness. Limits on the number issued to an individual, increases in their cost, and bonds were called for. Bond amounts from $500 to $10,000 were suggested as a means of deterring speculation.

3.4.2 **Control of Foreign Investment**

Foreign investment in B.C. finfish aquaculture was identified as a major concern, even though it was not actually within the Inquiry terms of reference. The commercial fishery associations argued that it is not in the best interests of B.C. to have foreign control of the salmon farming industry because of the likelihood of export of jobs and profits. They requested strict controls to prevent foreign corporations from taking over B.C. farms and related industries. They also urged government to buy out such foreign investment where it exists today. However, the aquaculture industry and certain government agencies pointed to the necessity of foreign money to offset the reluctance of Canadian financial institutions to provide loans. They argued that foreign capital and expertise is necessary to establish the industry but will soon decline in importance as companies begin obtaining funds through stock issues, and as Canadian investors gain more confidence.

It was also pointed out that most of the foreign investment is through equity financing, whereby partnerships are established with existing farm owner-operators, rather than through takeovers and creation of subsidiary companies. In the service industry, such as feed plants and equipment, Norwegians were reported to have established some subsidiary companies, but competing Canadian ventures were on the increase. One submission from fish farm interests pointed out that there were no controls on the sale of fish boats.

3.4.3 Inadequate Consultation With Interest Groups

Many concerns were expressed over consultation of interest groups in the aquaculture approval process. Many groups expressed dissatisfaction with the application referral process, either because the time available to provide comments is too short (30 days) or because their interests are not included in the process. Such groups as native bands, recreation associations and fish and wildlife clubs identified the need for prior consultation. Others stated that because of scattered membership, constitutional needs and other factors they needed more time for meaningful input. This comment was supported by several provincial and federal agencies that participated in the referral process. The aquaculture interests observed that the short referral period was necessary to keep processing time delays to a minimum. Another related concern was the ineffectiveness of the required advertising of application notices in informing the general public. Some groups argued that in many areas of application there are no effective ways to advertise, and requested that either the applicant or the government seek to inform the public by letter. Several local governments and residents suggested that prior notification and consultation by the applicant would be beneficial to him in properly designing his operations for public acceptance.

3.4.4 Local Government Involvement

The majority of local government agencies heard from were concerned over their degree of influence and role in the approval system. Agencies with heavily populated districts were concerned that they were

given insufficient time or opportunities in the referral process to consult with advisory planning groups or landowners adjacent to proposed aquaculture sites. Their stated preference was for participation, rather than information in referrals and approvals. Many did not have zoning in place to adequately regulate aquaculture operations or to address its impact on local services and adjacent zones. Salmon farmers, however, had mixed responses to this issue. Some welcomed greater local government involvement to educate the public on the benefits of their operations and gain the security of local support. Others were more cautious, pointing to the delays that would be encountered and the ability of local politicians to be influenced by local resident groups with personal rather than community interests in mind.

3.4.5 Length and Complexity of Approval System

The finfish aquaculture industry identified the approval system as a source of frustration. The high number of agencies involved in site approval, business licensing, fish production plans, hatchery effluent discharge, transfer of live fish, inspection of fish going to market, navigation permits, and other requirements was seen as a major source of frustration. Several groups identified the need to establish a "single window" agency responsible for coordinating all agency approvals, while other submissions reported that the existing framework of approvals was adequate but needed to be streamlined.

Also of concern was the fact that the federal Department of Fisheries and Oceans (DFO) requires an aquaculture licence in addition to provincial approvals, and that many of its requirements were a duplication of those obtained from provincial agencies. In contrast, many submissions, including those from organized interest groups, pointed to a lack of tight provincial regulations and approvals. Many groups were obviously unaware of existing provincial requirements, but generally cognizant of DFO siting requirements for locating salmon farms near shellfish beds, spawning streams, harbours and docks, and commercial fishing, recreational and native food fisheries. Several examples of applications approved by the provincial Lands agency in disregard for DFO guidelines were raised by various interest groups.

3.4.6 Production Plans and Diligent Use Enforcement

Salmon farmers were concerned that the existing fish farm production plans were too onerous and are responsible for major delays in the approval system (up to six months). Their association argued for its replacement by a performance contract which commits the farmer to a certain level of performance. They indicated that the current requirements for costing information, husbandry strategies and production harvesting strategies are inconsistent with the entrepreneurial spirit that government has encouraged in the industry. Several government agencies also believed its focus should return to ensuring proper site selection and management, while others thought such information necessary to monitor industry production and to ensure farm operations are properly planned. The general public interest tended to focus on "diligent", or proper site use. Several concerns were expressed that the basis of diligent use should be maintenance of site environmental quality. The infrequency of site inspection to check on diligent use was also mentioned, with a general concern that the approval agencies were too busy dealing with the backlog of plans to be able to conduct field inspections. Another concern was that existing farm operators who need to make major changes to approved production plans cannot get priority attention for these changes. As a result, they are forced to operate in contravention of the original diligent use standards of their lease.

3.4.7 Inadequate Rental and Bonding Requirements

Many comments were received from commercial fishery spokesmen and several other interest groups about low rental of Crown land. Government agencies readily admitted that the annual rental charged for finfish farms was considerably less than for other commercial or agriculture uses of public land, including shellfish operations. They recommended a review of the rental structure with the intent of increasing rental, and proposed a number of alternate methods. In addition, several groups called for establishment of bonds to allow government to pay for site clean up in the event of environmental problems or termination of a finfish operation, especially given the potential for damage

and the often remote location of sites. Several submissions suggested that a portion of rentals and bonds be allocated for research studies on finfish environmental effects.

3.5 LAND AND RESOURCE USER CONFLICT ISSUES

3.5.1 Need for Coastal Planning Studies

A consistent comment during the Inquiry was the need for coastal planning studies. This comment was made by all affected groups, including recreational boaters, commercial fishermen, and government agencies. Groups showed maps outlining their key interest areas and offered to participate in planning. Specific approaches to the way planning should be done were also suggested. Some desired planning for the entire coastline, while others preferred to work on specific priority areas. The Campbell River area was identified because of commercial fishery and recreational boating concerns, while the Islands Trust area was recommended due to settlement patterns, shellfish resources and recreational resources. Calls were also made for a more comprehensive planning approach in the Sechelt Inlet, due to potential impact on shellfish aquaculture operations as well as environmental limitations. Salmon farmers tended to focus their comments on indirect planning measures, such as site separation guidelines.

3.5.2 Loss of Anchorage and Access

The loss of anchorage was identified as a major problem. Marine towing companies, commercial net fishermen, and recreational boating groups expressed concerns that the coastline would soon be devoid of open anchorages for emergency and recreational use. Recreational boaters mentioned encountering blocked access to favourite bays and public beaches. One submission reported of fish farmers having roped off entire bays and occasionally firing warning shots to discourage access. Where boaters had chosen to anchor near fish farms, they reported encountering noise and general loss of pleasurable experience. Several

groups were concerned about the potential loss of park and recreational area shoreline to aquaculture, particularly in Desolation Sound. In contrast, farm operators spoke of their concerns about boater noise, fuel slicks, and discharge of human wastes. Several did, however, mention the positive relations they have built up with boaters by offering fish, farm tours, mooring buoys and emergency aid.

3.5.3 Upland Owner Impact

Several local residents spoke of concerns about declining property values due to the imposition of a fish farm along their view frontage. There were problems identified regarding generator noise, lights, loss of private boat moorage, water pollution, and aesthetic value deterioration where farms were adjacent to homes. Several local municipalities indicated that the farms were benefitting local residents indirectly through greater tax revenue and increased employment. Some submissions also believed that in most contentious areas of concern the landowners were seasonal residents and not appreciative of such benefits. Opinions were also shared that upland resident reaction was based primarily on fear of change. The aquaculture industry was concerned that studies done with over emphasis on adjacent residential owner concerns would drive the industry into remote and uneconomical settings, such as was the case with a recently completed guide to applicants in the Sechelt area.

3.5.4 Physical Obstructions to Fishery and Navigation

Several presentations to the Inquiry expressed concerns regarding the physical impact of fish farm sites. At least 4 examples were given by commercial fishery spokesmen of licences issued in traditional gill netting and seine netting grounds. Even if these licences might not result in farms, they were worried since there could certainly be impact on net dragging operations through installation of site monitoring equipment. Such occurrences were seen as evidence of disregard by provincial agencies for the commercial fishing fleet. A related concern was the navigational obstruction of fish farms, as feared by

representatives of the tow boat industry and recreational boaters. It was pointed out by the industry that Coast Guard permits are required to ensure navigation is not impaired, and that farms are required to place caution buoys within their vicinity. Coast Guard staff stated they were sufficiently concerned about the proliferation of site applications to be now considering more detailed permitting requirements.

3.5.5 Size and Spacing of Farms

Several resident groups, environmental interests and local government agencies wanted to see controls placed on the spacing or density of fish farms along the coastline and even within bays. Their concerns involved needs for reduction in concentrations of noise, environmental pollution, and aesthetics. Proposals for distance separations of up to 8 kilometres were made. Size limits on individual farms were also suggested as important to minimize such effects, and recent size restrictions imposed by the State of Washington were given as examples. Farm operators expressed concern over these suggestions, pointing out that many companies operate several farm sites and require closeness for economical reasons. Restrictions on area occupied by a farm could, they argued, lead to excessive crowding and stressing of fish, and result in increased fish mortality. It was also mentioned as preferable for a farm to have a relatively large area for "fallow" purposes to permit pen rotation.

3.5.6 Effects on Recreational and Tourism Industry

A number of submissions identified a major concern that the proliferation of fish farms would ultimately erode the tourism industry as related to recreational boating, sports fishing and commercial fish guiding. Statistics outlining the revenue and employment of this tourism activity were presented to show its significance compared to aquaculture. It was argued that environmental deterioration, reduced visual attractiveness, and disease-related reductions in the wild salmon population would all contribute to the decline in this industry. Aquaculturists believe that recreation and tourism would actually

benefit due to the attraction of touring farms. They also stated that increased demand by their industry for boats, motors, plastics and other equipment commonly manufactured by recreational related companies would increase employment in the recreation and tourism industries.

3.5.7 Involvement of Fishermen in Farm Industry

A central issue was the opportunity for commercial fishermen and shoreworkers to become involved in the aquaculture industry. Several submissions identified Norwegian government programs designed to allow fishermen to offset their short income earning period with fish farm employment. The Prince Rupert Fishermens Co-op was cited for its attempt to encourage fishermen in this fashion through loans and technical training. The greater safety and efficiency of farming rather than chasing fish was frequently mentioned as evidence of the desirability of increased farm involvement. Fishermen, however, found the concept unacceptable for philosophical reasons, stating a preference for being "high seas hunters" rather than farmers living, in their opinion, a boring and isolated existence. Some identified the low wages of farm work as a major factor, while many submissions pointed to the very large capital outlay required to start a fish farm and the difficulty of obtaining loans. The fallacy of believing that "ma and pa" operations could ever develop with the large investment now required was also mentioned, and generally confirmed by existing farm operators. In addition, the heavy commitment to fishing through investment in equipment, licences and vessels was also identified by fishermen as a major factor working against their entry into the aquaculture industry.

4.0 RECOMMENDATIONS TO GOVERNMENT

4.1 GOVERNMENT SUPPORT

4.1.1 The provincial government should continue its support for the finfish aquaculture industry.

British Columbia has demonstrable competitive advantages over other countries in attracting and developing a world-scale finfish aquaculture industry. It is important to the economic growth and diversification of the province that government continue its support of the industry in key stages of development. The 70 currently operating salmon farms already represent a direct capital investment of $75 million, employ 375 people directly and annually spend an estimated $50 million on services and supplies. Aquaculture holds the promise of expanding employment, increasing capital investment in B.C., revitalizing economically depressed communities, and strengthening the commercial fishery sector as a whole. The Province should seize this opportunity to generate additional capital, employment, and business activity along the coast.

4.1.2 The provincial government should develop a provincial aquaculture policy which clarifies provincial direction, agency roles, and the responsibilities of both government and the private sector for the industry.

The lack of a strong provincial statement is viewed as detrimental to orderly and efficient growth of the industry. Development of such a policy should provide better understanding between government and the industry, reduced likelihood of competition between programs of different agencies, and better coordination of government activities. It is also viewed as necessary to ensure that environmental, land use, social and economic factors are identified as critical components of growth and regulation of the industry. Inclusion of policy on these topics of concern will help alleviate public concerns over lack of controls, and lack of protection of the public resource. It would also serve to off-

set creation of the image of an uncontrolled, "gold rush" in aquaculture, which has been responsible for generating considerable misunderstanding and suspicion about provincial government objectives. This policy should be developed by the provincial lead agency and formally adopted by all pertinent ministries.

4.1.3 **The provincial government should establish an aquaculture advisory council from key agencies and interest groups.**

The Inquiry supports the recent provincial government call for an aquaculture advisory council. This group will be able to provide an industry perspective on resolution of issues, government program priorities, interagency agreements, and provincial policies. Direct involvement of the industry is considered critical for the development of finfish aquaculture, and should ease its adjustment to changes in government regulation and support as it continues to evolve. The Inquiry believes that other key resource user groups should also be members of this council. Representation by commercial fishery groups, native groups, recreational groups, and the Fisheries Council of B.C. would ensure that future industry development is in harmony with these interests.

4.1.4 **The provincial government should continue to encourage private sector initiatives as the basis for growth and development of the finfish aquaculture industry.**

The B.C. finfish aquaculture industry has to date developed with very limited direct funding. The provincial government has provided some financial assistance programs; while both federal and provincial agencies have provided support in marketing, research, egg supply, disease and diagnostic services, and other critical areas of the industry during its initial stages of development. Evidence suggests that the industry is rapidly attracting the expertise and capital to provide its own servicing needs without the necessity of long-range government involvement. Controls on foreign investment, vertical integration and other elements of a free enterprise system in this industry are inconsistent with the treatment of other industries in British Columbia.

4.1.5 **The provincial government should proceed immediately to establish a master agreement with the federal government respecting approvals, regulation, monitoring and servicing of the finfish aquaculture industry.**

Both provincial and federal agencies are involved in regulation, approvals, monitoring, marketing, and promotion of the industry. To assist in the streamlining of industry approvals, assure protection of wild fish stocks and monitor the environment, the two levels of government should coordinate their efforts. This agreement is also needed to reduce incidences of agency friction and establish clearly in the public mind specific responsibilities and jurisdictions. The Inquiry believes that such an agreement should promote the development of "subsidiary" agreements between specific agencies on particular issues, such as referrals and site monitoring. One agency in each government level should be designated the lead agency to work with others in developing the master agreement. Federal agencies should include Department of Fisheries and Oceans, Environmental Protection Service, the Coast Guard, and Indian Affairs.

4.1.6 **The provincial government should support greater cooperation with local government in promotion, planning and approval of finfish aquaculture.**

Cooperation between both levels of government is important for political, economic and social reasons. Local government is the first line of approach when local residents object to a proposed fish farming operation. Unfortunately many local governments are unable to direct the proposal to more socially-acceptable locations. In other instances, proposals are poorly advertised or referrals are made with inadequate opportunity for local citizen comment. In some locations along the coast, local governments are eager to attract this development but lack the resources and expertise. Provincial cooperation should include funding for promotion and planning of aquaculture, provision of model by-laws, and participation by provincial resource agencies in local planning. It should also include the opportunity for better consultation with local government and a commitment for greater

consideration of local government concerns in the tenure approval process.

4.1.7 **The provincial government should affirm and maintain its commitment to the federal-provincial Salmonid Enhancement Program, Phase 2.**

The Salmonid Enhancement Program is very important to the commercial and sport fishing industry as a supply of wild salmon stock. It is similarly of great importance to the salmon farming industry at this time as a source of eggs for brood stock and marketable fish. Phase 2 of the program is designed to establish additional wild stock hatcheries in B.C. Continued support of the Salmonid Enhancement Program is necessary to assure prosperity of all segments of the B.C. fishery. A statement of continued provincial support should include a commitment to provide SEP funding, provincial land for site requirements, and to procedures and policies of government agencies preventing degradation of enhancement watersheds.

4.1.8 **The provincial government should lift the current moratorium on the adjudication of applications for finfish aquaculture sites.**

The information made available to the Inquiry fails to adequately substantiate maintaining the October 31, 1986 moratorium. The Inquiry believes that the recommendations contained in this report, if implemented, will alleviate most of the problems attributed to fish farming and establish mechanisms for alleviating the others.

A larger or lengthier commission of Inquiry would certainly have generated more detailed scientific submissions and more information on market impacts and resource conflicts. It is doubtful, however, that the outcome of this report would have been substantially different. The moratorium should be lifted in conjunction with initiation of the studies and policy changes recommended in this report.

4.2 INFORMATION AND EDUCATION

4.2.1 The provincial government should expand its public information programs to provide a broader range of services and information access.

Public information on finfish aquaculture and its potential impacts is both limited in scope and availability. While a number of government agencies have developed brochures on specific topics, these have been directed to specific user groups and largely written in reaction to problems. These publications tend to be distributed in areas only after aquaculture concerns have surfaced and not before. It is also important for the provincial government to increase its circulation of information to a much wider segment of the population, including schools, libraries, municipal halls, and interest groups.

Public access to research reports acquired by government is also suggested. This can be done through the industry newsletter published by government and by distributing summaries of findings to the many interest groups affected by, or interested in the results of these marketing, environmental, or land use studies. The government should also seek to increase public awareness of the aquaculture resource centres that it has helped establish. Such information and education programs should be rationalized as part of a broader extension services function by the Ministry of Agriculture and Fisheries.

4.2.2 The provincial government should encourage a formal communication link between the commercial wild fishery and finfish aquaculture associations.

Increased awareness and understanding between commercial fishermen and salmon farmers is a desirable method of reducing friction. The results of this Inquiry will certainly increase group awareness but will be less effective in promoting understanding. The provincial government is urged to create opportunities for formal exchange of interests among these groups by involving both in future planning studies, advisory

councils, seminars, conferences, and other activities of mutual interest sponsored by government. Through such learning processes the two groups may be able to minimize philosophical differences and work to the benefit of the entire B.C. seafood industry.

4.3 NATIVE INVOLVEMENT

4.3.1 **The provincial government should endorse federal initiatives to increase native involvement in finfish aquaculture development.**

Finfish aquaculture provides a rare economic development opportunity for native bands. They are, however, disadvantaged with respect to ability to obtain the necessary venture capital, job training, farm management expertise, marketing and support services. The federal government, which has prime jurisdiction over native affairs, should be encouraged to develop programs to assist native bands in overcoming these disadvantages. The provincial government should seek ways of involving native bands in its aquaculture assistance and extension programs.

4.3.2 **The provincial government should encourage the finfish aquaculture industry to involve native peoples in the industry.**

Native communities provide several potential advantages to aquaculture developments. In remote areas they will offer a stable and readily available source of farm labour. Joint venture developments on indian reserves may offer tax advantages as well as the potential for accessing federal funds related to manpower training and native economic development. Several farm operations have realized these advantages and are including natives in their employment plans. The Salmon Farmers Association should establish a policy to promote native interaction and utilization and encourage their participation in the industry and in its association.

4.3.3 **Current aboriginal land claim negotiations should not influence government policies and procedures respecting issuance of finfish aquaculture tenures.**

The current dispute over aboriginal land claims threatens to disrupt the opportunities of native bands to become involved in the aquaculture industry. The provincial government should ensure that aquaculture applications by native bands are dealt with using the same process and time periods that govern the review and adjudication of any other application. Tenure documents issued to native groups should also be no different in substance than those issued to other applicants. Cnnversely, native groups cannot expect the province to abrogate its current jurisdictional responsibilities for land tenure as a result of this Inquiry, and must be prepared to obtain legal tenure from the province in order to initiate aquaculture development. It would be irresponsible of either party to use the land claims issue to the detriment of future economic development of native communities.

4.3.4 **The provincial government should recognize native bands as legitimate interest groups in the land referral and tenure process.**

The Inquiry does not support the native group call for control on tenures within an 8 kilometre radius of indian reserves, due to the implications for the aboriginal land claims position. Native bands nevertheless deserve equal treatment with other interest groups when applications are made in the vicinity of reserves. Referral of finfish aquaculture applications should be made to native bands when proposed sites are adjacent to, or within 3 kilometres of the boundary reserve. Referrals will be useful not only to allow an identification of potential resource conflicts, but also to allow the band to discuss with the applicant the possibilities of native involvement in the aquaculture operation.

4.4 FISH MARKETING AND PROCESSING

4.4.1 **The provincial government should continue to rely upon market forces to dictate farm and wild salmon prices.**

The Inquiry believes that the increased production of B.C. farm salmon will enhance the economic health of the total fisheries industry of the

West Coast. Government efforts to eliminate or minimize fish farm "competition" through marketing controls, production limits, or other mechanisms, would have little effect on prices of wild chinook and coho, since competition will be derived from foreign sources of farmed salmon on the world market. B.C. farm salmon products have not been demonstrated to affect wild salmon prices to date, and should be able to avoid price influences in the future by concentrating on specialty markets in the USA in which the major wild catch product does not compete.

4.4.2 **The provincial government should support a strategy for the integrated marketing of B.C. farm and wild salmon products.**

Improved marketing of B.C. salmon is the most desirable course of action to strengthen both finfish aquaculture and commercial fishery industries. New markets should be explored, as well as new ways of packaging and new types of salmon product. More efficient marketing and quality improvement is also required. Products should be directed to different markets at different times of the year, and distinctly identified as B.C. products. The government can support such a strategy through financial assistance, trade missions, and technology transfer. Government should also work with industry to monitor downstream market impact of this strategy on salmon prices to gauge the degree of compatability of wild and farm products in the market place.

4.4.3 **The provincial government should promote use by the aquaculture industry of existing processing plants and infrastructure developed for the wild fishery.**

The Inquiry believes the current trend among existing farm operators to process their product through existing plants, and the increased joint venturing and contracting between existing processing companies and fish farms will strengthen the fishing industry in B.C. and should be encouraged. Government promotion should include review of regulations governing the on-farm processing of salmon, transport of live salmon to plants, and inspection and grading of processed products both on and off-farm.

4.5 MARINE ENVIRONMENT

4.5.1 The provincial government should increase its support for research and studies on the potential long-term effects of salmon farming on the marine biological and physical environment.

Studies performed to date do not confirm the fears expressed over the effects of fish farming on the marine environment. Available studies identify the major impact as alteration of the local seabed due to the build up of organic waste from fish pens. The Inquiry believes that studies should be initiated in selected areas to develop an improved information base on this subject. In particular, studies should be performed on the effects of fish farms on shellfish and other bottom dwellers, and upon water quality. These studies will prove as important to the industry in identifying potential problems as they will to the general public. Support should come through form of grants to independent research facilities and universities as well as through government staff investigations.

4.5.2 The provincial government should establish a mandatory environmental monitoring and data gathering system for each aquaculture site and surrounding area, the results of which should be submitted on a regular basis for review of changes in environmental quality.

Environmental monitoring represents a major deficiency in the regulation of finfish aquaculture. While most finfish aquaculture operations maintain a monitoring system, the logical focus is on-site growing conditions. Monitoring of on and near-site environmental conditions should become a standard requirement of aquaculture tenures, with the measurements to be recorded and regularly submitted for government review. The Environment ministry should establish the parameters to be measured, acceptable standards for these parameters, and methods of measurement and recording. The parameters should be those commonly used to assess changes in marine environmental conditions and also those of value for monitoring of the finfish growth environment. This data will be of value in studies of long-term environmental changes and

can also be used to determine whether or not an operation should be moved. Inherent in this requirement is the necessity for government to establish standards which divide acceptable conditions from unacceptable.

4.5.3 **The provincial government should end the importation of Atlantic salmon eggs.**

The continued importation of Atlantic salmon eggs extends the risk of introducing European diseases to wild stocks, with consequent impacts on the fishing industry. This risk exists despite the severe screening, quarantine and effluent treatment standards imposed by government on egg imports. A draft federal-provincial agreement confirms these rigid standards and calls for an end to egg importation in March, 1989. While supporting most of the agreement, the Inquiry believes importation should be maintained only for the time necessary for the industry to meet existing purchase commitments. Brood stock is now or will shortly be producing eggs to supply West Coast farms. Provided that small volume imports are occasionally permitted for genetic improvement, a fall-1987 closure is considered realistic. The two governments are urged to ratify their agreement with amendments as noted above. This reduction does, however, place greater importance on the need for government to maintain its commitment to supply surplus chinook and coho eggs to the aquaculture industry.

4.5.4 **The provincial government should continue the use of a distance guideline to separate fish farms, and should apply this guideline to separate fish farms from shellfish aquaculture operations.**

Transfer of native diseases between fish farms should continue to be minimized to reduce the potential for crop losses to aquaculturists. The Inquiry believes that the current 0.8 kilometre distance used to separate fish farms should be increased to at least 3 kilometres, and that the guideline be similarly applied to separate existing oyster farms from proposed fish farms. Any decision to reduce this distance

for a new farm should be based on specific site factors, such as flushing and depth characteristics, and not on the preference of the established operator. This recommendation does not rule out the possibility of growing salmon and oysters in the same farm operation, but serves to protect existing farms from new ones.

4.5.5 **The provincial government should establish, in conjunction with industry, environmental practices for fish farms addressing aesthetic considerations, disposal of dead fish and human waste, predator control, and efficient feeding practices.**

A variety of on-farm operating practices have the potential for damaging effects on the local marine environment and its enjoyment by other users. Although most existing farm operators are very conscious of maintaining sound environmental practices they should be documented and distributed to encourage their application on the farm and change public perceptions. It is suggested that a handbook be prepared in consultation with the industry and made available to aquaculturists and the public through government aquaculture extension services.

4.5.6 **Government should increase its research, health inspection and testing activities with respect to the impact of toxicants, hormones and antibiotics used in finfish aquaculture on the environment and the human food chain.**

As with most cultured food products, farm fish are exposed to a number of chemicals designed to manipulate growth and maintain health. The findings of several recent studies indicate no human health implications with the possible exception of the toxicant TBT, used as an antifoulant for net pens. Investigative research and testing is required to provide more information on the type, degree and severity of risks as a basis for eliminating them. At present, stringent provincial and federal legislation is in place to govern the testing and inspection of fish products for the presence of toxic materials, hormones and antibiotics. However, evidence suggests that inspection activity is very

limited due to staff shortages. Testing is also infrequent due to the remoteness of federal testing facilities. Both of these activities should be increased.

4.5.7 **Government and industry should support the development and operation of an aquaculture research centre as a focus for environmental studies, disease research, fish testing and diagnostic services.**

The controversy over potential environmental impacts of finfish aquaculture has underlined the importance of research studies and testing. Research needs have been identified in almost every specific area of environmental concern addressed by this report. Staff and funding levels in government have not kept pace with growth of the industry. While private sector initiatives in research have been commendable, they have focused on developmental aspects of fish culture rather than environmental effects. Government should expand its responsibility for research on those aspects of fish culture affecting other marine resources and seek to provide the testing and monitoring services for public benefit as described in Recommendation 4.5.6.

4.5.8 **Government should encourage establishment of standards for finfish aquaculture equipment to remove the potential for accumulation of toxicants in farm fish products.**

The toxicant tributyltin (TBT) is a current concern at this time. Since the source of most toxicants in fish flesh is specific plastics and paint used in net pen structures, the provincial government should encourage the appropriate federal board to establish legally enforceable standards for finfish aquaculture pens and other containment devices. These standards should eliminate the use of toxicants which may affect human health through concentrations in fish and shellfish. Government should also request a full review by the federal Department of Agriculture of TBT health impacts. In the meantime, the province should discourage the use of TBT as part of its extension and information services program (see Recommendation 4.5.5).

4.5.9 **The provincial government should undertake a review of the occupational environment of finfish aquaculture operations to ensure appropriate regulations for occupational health and safety are in place.**

The Inquiry believes that attention must be focused towards impacts of finfish aquaculture on the working environment of its employees. A review of existing labour regulations applicable to finfish aquaculture is appropriate given the projected increase in farms and farm workers, and should include requirements for diver training and rescue, personal flotation devices, hand rail systems, emergency medical services, and proper handling of chemicals and pharmaceuticals.

4.6 USER CONFLICTS AND SITING

4.6.1 **The provincial government should initiate a program of coastal resource identification studies for use in directing aquaculture applications away from major resource and user conflict areas.**

The importance of multiple use of coastal waters and the diversity of resource users must be acknowledged. While the application referral process of government attempts to consider such factors it creates considerable uncertainty among competing site users about the identification and protection of their interests. Planning studies are urgently required to minimize this uncertainly. The most appropriate course of action at this time is to initiate studies that will identify sites of high value for other important coastal interests and which should be reserved from aquaculture activities. Identification of these sites will allow government to direct aquaculture proposals to areas where physical impact on other users will be lessened. Specific siting within these remaining areas can then be determined on the basis of environmental factors.

4.6.2 **Coastal resource identification studies should be initiated immediately for the Campbell River - Johnstone Strait, Islands Trust, and Sechelt Inlet areas with direct involvement of all resource user groups in those areas.**

Three particular areas of the coast require priority attention for completion of coastal resource studies. These were identified on the basis of areas of conflict apparent in written and oral submissions to the Inquiry, and on the areas of high aquaculture growth projections as identified through the mapping of Section 10 licence applications. The studies for areas of lower priority can be initiated under less pressing circumstances. The quality and success of these studies will depend on the degree to which all recognized interests are involved. Government should review the information record of this Inquiry to identify interest groups in the priority study areas. They will include commercial fishery unions, tow boat operators, recreational boaters, aquaculture associations, native groups and local government. Such studies should aim for completion within a 10 week time frame, given the need to maintain confidence in the finfish aquaculture industry and the fact that many groups have already mapped their high interest areas.

4.6.3 **The provincial government should discontinue issuance of aquaculture tenures adjacent to provincial parks and recreation areas.**

Maintenance of natural shorelines fronting provincial parks and recreation areas is considered important for aesthetics, anchorage, and a satisfactory recreational experience. The potential aquaculture sites along the coast line are sufficiently great that the provincial government should feel no obligation to authorize finfish aquaculture adjacent to park and recreation areas. While there are no finfish aquaculture operations in such areas at present, they are no doubt attractive due to absence of adjacent residents and other potential sources of conflict or competition. A statement from government on this matter will ease considerably the concerns of the public.

4.6.4 **Local governments should be encouraged to develop or refine local zoning bylaws to address finfish aquaculture operations within their boundaries.**

The Inquiry believes that approval of aquaculture locations should remain a provincial resource allocation decision. However, zoning is a

major tool available to local government to ensure aquaculture operations are compatible with adjacent uses. Local zoning for aquaculture is highly desirable in the more heavily populated areas of the coast, and should be encouraged through provincial technical assistance and grants. Zoning should emphasize restrictions on operating conditions, aesthetics, servicing and other items of community importance and consider the economic implications of such restrictions on the proposed fish farms.

4.6.5 **The provincial government should utilize a minimum distance separation guideline for fish farms in populated coastal areas as a means of reducing impact on upland owners and other resource users.**

In most cases fish farms are located a sufficient distance offshore to avoid impact on riparian rights of upland owners and navigational rights of boaters. However, concerns exist in some areas over visual impact and reductions in property values due to increasing concentrations of farms along the coastline. To address these concerns the Inquiry considers it appropriate to establish a distance separation between farms. To date, distance separation relates to concerns over disease transference between farms. However, the concept is also valuable for use in establishing a crude development density in selected coastal areas, in the absence of detailed site investigation or resource user information. The distance should coincide with that established for disease as in Recommendation 4.5.4.

4.6.6 **The aquaculture industry should be encouraged to institute a program to provide anchorage, access, and emergency assistance to other coastal resource users.**

Coastal resource identification studies will not entirely negate the requirements of other coastal resource users for access to previously undeveloped bays, coves and beach areas. It is in the best interests of fish farmers to offer safe anchorage, emergency medical and mechanical assistance, and other services to boaters under controlled conditions. A "friendly cove" program could be developed among the aquacul-

ture associations which provides standard identification signs and outlines basic services available from participating farms. Government could assist through navigation chart identification and through information and extension services aimed at public and commercial boaters.

4.7 REFERRALS AND ADVERTISING

4.7.1 The provincial government should continue its use of the interagency referral system as a primary tool for conflict resolution.

The referral system for approval of land applications is important to government as a primary planning tool to identify land use concerns of various interest groups. It is also of value in identifying site limitations and establishing special management provisions to be attached to the legal occupation of the land. The referral system should therefore continue to play an integral part in the finfish aquaculture approval process. Within areas where coastal resource identification studies are in place, it will be more appropriate to give greater weight to referral comments dealing with environmental characteristics of proposed sites and special management considerations rather than user conflicts.

4.7.2 The provincial government should expand its list of referral groups, increase the time available for response, and establish subsequent notification practices for finfish aquaculture referrals.

The provincial Lands agency should reduce the discretion available in selecting interest groups to participate in its referral process and establish a broader list of standard interest groups to be consulted. These should include commercial fishery groups, native bands, oyster growers, and recreational boating interests. The information record of this Inquiry should assist in identifying such groups. The time available for meaningful comment on applications should also be extended. The Inquiry believes that a sixty day referral period is necessary, given the increased involvement of groups whose comments are made difficult to assemble as a result of remote locations, commitments to

full communication, or broad membership distribution. The notification practices of government are also in need of change to ensure that the referral groups are informed of the outcome of the review process for inventory and planning purposes.

4.7.3 **The provincial lands agency should establish an agreement with federal agencies respecting siting of tenures, information requirements, documentation of concerns, and importance given to referral comments.**

The overlapping site approval requirements between the provincial and federal agencies is a source of frustration to the aquaculture industry, and deleterious to public confidence in the ability of government to provide adequate development safeguards. The Inquiry believes that the Department of Fisheries and Oceans (DFO) must be an integral part of the provincial referral system in order to assist in streamlining the approvals procedure. DFO approval of a site should be required prior to the issuance of tenure by the provincial Lands agency. An agreement will be necessary to establish this relationship and to reconcile requirements of both agencies for growing sites and hatcheries. It is also required to determine the degree of substantiation that is acceptable to the provincial government as a basis for site rejection. This agreement should be a subsidiary to any master agreement on finfish aquaculture established between the provincial and federal government as per Recommendation 4.1.5.

4.7.4 **The provincial lands agency should review its practices involving advertising and notification for prospective finfish aquaculture operations.**

The lack of adequate public notification of finfish aquaculture applications should be remedied by the Ministry of Forests and Lands. Current requirements should be reviewed to ensure that notification reaches residents adjacent to the site, especially where such residents are poorly served by the print media. Telephone, letter or other communication services may be required to offset the lack of notification. Where rezoning is required, or where no zoning is in place, an

applicant should also be required to notify local residents and local government of his intentions, as a means of activating discussion. Such notification will be of value to the applicant in site and facility planning as well as in determining the likelihood of local government cooperation.

4.7.5 **The provincial lands agency should place greater emphasis on local government input to the finfish aquaculture referral process.**

The degree to which local government referral comments influence provincial decisions on aquaculture should be clearly identified in government policy. The relevance of local government comments has generally been minimized by the lack of time available to respond to the referrals. Extension of the referral period to 60 days should assist in lending more weight by providing local government the opportunity to obtain additional information. Local governments should use the additional time to refer the applications to local advisory committees or to affected adjacent landowners for input, as a means of increasing the impact of their recommendations.

4.8 PRODUCTION PLANS AND DILIGENT USE

4.8.1 **The provincial government should remove requirements for cost, husbandry, production and harvest strategies from its fish farm production plan.**

The Inquiry believes the involvement of government in finfish aquaculture is more appropriately directed to the protection and proper management of public resources, rather than to private businesses and privately-owned fish. Removal of costing information, husbandry strategies, production and harvest strategies from existing production plans is needed to return the government focus to resource management, and to assist in streamlining the approval process. Increased government field extension services, and the need to obtain business financing should ensure that the prospective aquaculturist is cognizant of these requirements. Site characteristics, locational information, and

schedules of improvements should constitute the main elements of the plan for site management.

4.8.2 **The provincial government should establish minimum fish production levels and environmental quality standards for use in measuring diligent use, and increase its site monitoring and inspection activities.**

Standards are required to allow government to determine whether or not a finfish aquaculture operation is making appropriate use of a tenured site. A minimum production level of fish is the simplest and most appropriate measure of diligent use from a development perspective. Standards should be prepared on the basis of current knowledge of fish mortality and growth rates by species at different ages, and combined with an applicant's schedule of net pen improvements to establish annual production levels for each year of operation on a site. From a protection perspective, diligent use should be measured according to changes in site environment as measured against standards proposed as per Recommendation 4.5.2. Failure to maintain environmental standards or to achieve fish production levels should be a basis for tenure cancellation. The existing level of site inspection must also be increased to enforce diligent use.

4.8.3 **Production plans for site and improvement locations should be expanded to include the demarcation of public use and access requirements.**

The production plan approved by government becomes a legally enforceable component of the lease or licence tenure. It therefore provides an opportunity to legally incorporate desirable forms of access and assistance to other users. The site map and location of improvement submitted in a plan should be required to indicate provisions for emergency or overnight anchorage, access channels to public beach, and riparian access channels for upland owners where applicable. These requirements are appropriate to promote cooperation between private finfish aquaculture and public interests along the coastline.

4.8.4 **The production plan process should establish a priority system to accommodate review and approval of significant plan revisions necessitated by disease outbreak, tenure assignments, and other factors influencing tenured operations.**

The policy of requiring approval of alterations to existing production plans is basically sound but causes difficulty as a result of the existing backlog of production plans in the review process. Government should give priority to review of modifications required for existing farms. This practice should not be used to expedite the plans of farms which are in illegal occupation of sites, but rather to accommodate problems or requirements of existing tenured farms.

4.9 LAND TENURE

4.9.1 **The provincial government should continue its use of Section 10 of the Land Act to authorize site investigations for finfish aquaculture.**

The Section 10 licence is an appropriate form of tenure for the finfish aquaculture industry. It provides the opportunity to conduct site research and investigation without committing government to subsequent approval of a fish farm. Unfortunately its use has been largely responsible for the "gold rush" image created in the public mind and has been abused in some areas by establishment of unauthorized improvements and fish production. To offset this negative image and more accurately reflect its nature, the Section 10 should be renamed (eg. "investigative permit"). In addition, government should begin to increase its surveillance of these permits and cancel them upon discovery of abuse.

4.9.2 **The provincial government should require a commitment bond to accompany all finfish aquaculture applications.**

A commitment bond is recommended as a means of minimizing the ability of applicants to tie up potential sites for speculative or competition reducing purposes. As the name implies, this bond should establish the

commitment of an applicant to seriously pursue his aquaculture interests. The Inquiry believes that such a bond should also be used to provide a source of funding for joint government-industry research on aquaculture development and environmental effects. Consequently the bond should be levied for all types of finfish tenure applications. Government should implement a system of refunds and partial refunds for the bond, which ensures that each application generates some level of support for research on the basis of success in the approval process. With this bond system in place, it may be unnecessary for government to retain an arbitrary ceiling on the number of sites which can be applied for by one applicant.

4.9.3 **The provincial government should revise its rental rates and clean-up bond requirements for finfish aquaculture tenures.**

Inadequate rentals and clean-up bonds are a recognized weakness in existing government policy. The maximum rental of $200 per year is insufficient compensation to government for private use of Crown land. The Inquiry recommends a new rental structure be established, consistent with other approaches used by the provincial government. Clean-up bonding should also be required as a condition of tenure. Government should require deposit of a bond to cover clean up expenses in the event of cancellation or abandonment of the site tenure. The bond should be accessible to provincial and federal agencies responsible for rehabilitation of such sites.

4.9.4 **The provincial government should review and expand its legal tenure documents for finfish aquaculture.**

This report recommends a shift in the regulation process towards provision of environmental safeguards, consideration of other user interests, and conflict avoidance. Such items should be incorporated as legally enforceable provisions of leases and licences issued for finfish aquaculture operations. They include special provisions for mandatory site monitoring and reporting, aesthetic and visual standards, and demarcation of tenure area. The identification of naviga-

tion and access channels and emergency anchorage should also be included as per Recommendation 4.8.3.

4.10 PROVINCIAL AGENCY APPROVAL SYSTEM

4.10.1 **The present provincial agency approval framework should be maintained.**

The Inquiry believes that the finfish aquaculture approval system should continue to evolve within the existing framework of legislative responsibilities. Establishment of a "single window" agency would, unless accompanied by a major legislative overhaul, result in one additional level of contact, further time requirements, and major staff reallocation. To be effective, the single window agency would have to be a neutral rather than an advocate agency. The consolidation of legislative requirements affecting aquaculture siting and approval (eg. an Aquaculture Act) would create anomalies and inconsistencies among remaining programs of the affected agencies. The Inquiry suggests that agencies involved in the existing process should continue to work together using operational agreements and other mechanisms to achieve their objectives. Policies and procedures should be constantly reappraised to ensure they continue to encourage orderly development of the industry and safeguard the public interest.

4.10.2 **The role of the Ministry of Agriculture and Fisheries as lead provincial agency should be clarified and focussed.**

The role of lead agency is presently blurred by the heavy involvement of the Ministry of Agriculture and Fisheries in production plan approvals. As such it is often perceived as a support agency for the Ministry of Forests and Lands, which is responsible for approval of land tenure. Absence of a major field extension and information services program also diminishes the public perception of Agriculture and Fisheries as the lead aquaculture agency. To clarify its role, the Ministry should reallocate its aquaculture resources to satisfy ever-increasing needs for extension services to fish farmers, information to the public, and research support to both industry and environ-

mental monitoring agencies as per recommendations in Section 4.2. In addition it should begin a central inventory service for up-to-date information on tenures, land interests, land conflicts, and coastal resource inventory data of value to future aquaculture planning and development.

4.11 REPORT IMPLEMENTATION

4.11.1 **Due to the broad scope of the Inquiry terms of reference, the report on finfish aquaculture in B.C. should be reviewed by all provincial government ministries with responsibilities for implementation of its recommendations.**

4.11.2 **The implementation of recommendations by individual agencies should be done in a coordinated manner and over as short a time period as possible to minimize disruption to the finfish aquaculture industry and to prevent speculative activity.**

4.11.3 **Adjustments to the government approval process and the preparation of coastal resource identification studies should be performed over the same time frame.**

4.11.4 **In fairness to those tenures caught in the government moratorium, finfish site applications filed before October 31, 1986 should be allowed to proceed under existing policies and procedures. Those received after the October 31 moratorium should be subject to new policies, procedures, and resource study restrictions as they fall into place.**

4.11.5 **Given the many similarities and the efficiency of a single policy framework, the recommendations of the Inquiry on finfish aquaculture should be considered by government for their application and relevance to other forms of commercial aquaculture.**